

2/10/17 "An eye for an eye only ends up making the whole world blind."-Gandhi

HW: "Optimization packet" page 126 #5  
Test 1 on Thursday 2/16

AIM: How do we minimize materials used?

Warm Up:

- 1) What is the formula for the surface area of a right cylinder?

$$SA = 2\pi r^2 + 2\pi r h$$

- 2) What is the formula for the volume of a right cylinder?

$$V = \pi r^2 h$$

4. What is the radius of a cylindrical soda can with volume of 512 cubic inches that will use the minimum material?

Minimize Surface Area

$$SA = 2\pi r^2 + 2\pi r h$$

Volume

$$V = \pi r^2 h$$

$$512 = \pi r^2 h$$

$$\frac{512}{\pi r^2} = h$$

$$SA = 2\pi r^2 + 2\pi r \left( \frac{512}{\pi r^2} \right)$$

$$SA = 2\pi r^2 + 2 \left( \frac{512}{r} \right)$$

$$SA = 2\pi r^2 + 1024 r^{-1}$$

$$SA' = 4\pi r - 1024 r^{-2}$$

$$0 = 4\pi r - \frac{1024}{r^2}$$

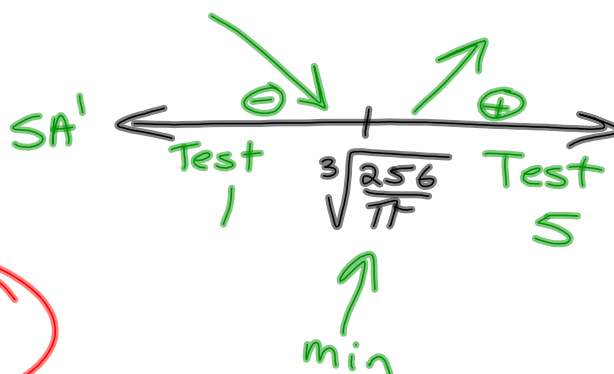
$$\frac{1024}{r^2} = 4\pi r$$

$$1024 = 4\pi r^3$$

$$\frac{1024}{4\pi} = r^3$$

$$\frac{256}{\pi} = r^3$$

$$\sqrt[3]{\frac{256}{\pi}} = r$$



$$r \approx 4.3 \text{ inches}$$